

**Research Note**

**Tetrathyridia of *Mesocestoides lineatus* (Cestoidea: Cyclophyllidea) in *Sceloporus undulatus hyacinthinus* (Sauria: Iguanidae) from Arkansas**

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**ABSTRACT:** Twenty-nine northern fence lizards, *Sceloporus undulatus hyacinthinus* (Green, 1818), from 7 counties of Arkansas were examined for *Mesocestoides* sp. tetrathyridia. Only 1 (3%) of the lizards was found to be infected. Over 300 living tetrathyridia in 2 distinct size classes were found free in the coelomic cavity and encapsulated forms infected the liver, intestinal mesenteries, and musculature of this host. None of these tetrathyridia showed any evidence of asexual reproduction, even after up to 6 mo of maintenance in the body cavity of experimentally infected mice. When administered to hamsters by stomach tube, the tetrathyridia developed into gravid adults identified as *Mesocestoides lineatus* (Goeze, 1782). This constitutes a new host record for *M. lineatus* and represents only the second time a lizard from Arkansas has been reported to harbor tetrathyridia of *Mesocestoides*.

**KEY WORDS:** *Sceloporus undulatus hyacinthinus*, *Mesocestoides lineatus*, fence lizard, survey, tetrathyridia, Cestoidea, Cyclophyllidea, Arkansas.

Numerous North American lizards (Sauria) are known hosts of *Mesocestoides* sp. tetrathyridia (McAllister, 1988; Goldberg and Bursey, 1990a; McAllister, 1991; McAllister et al., 1991b). This metacestode has been reported frequently from lizards of the family Iguanidae, particularly *Sceloporus* species (Voge, 1953; Telford, 1970; Benes, 1985; McAllister, 1988; Goldberg and Bursey, 1990b).

As part of our continuing effort to collect information on infections of *Mesocestoides* sp. tetrathyridia in amphibians (McAllister, 1987; McAllister et al., 1989; McAllister and Conn, 1990) and reptiles (McAllister, 1988, 1991; Conn and McAllister, 1990; McAllister et al., 1991a, b, c), we examined several northern fence lizards, *Sceloporus undulatus hyacinthinus* (Green, 1818) from various localities in Arkansas for the parasite. Herein, we characterize an infection in 1 of these hosts.

Between April 1979 and 1980 and again between May 1989 and November 1990, 29 hatchling, juvenile, and adult *S. u. hyacinthinus* (snout–

vent length [SVL] range = 22–68 mm) were collected by hand from (sample sizes in parentheses): Carroll (2), Izard (19), Marion (2), Perry (1), Polk (1), Pope (1), and Yell (3) counties of Arkansas and examined for *Mesocestoides* sp. tetrathyridia. Lizards were returned alive to the laboratory for examination and killed with an overdose of sodium pentobarbital (Nembutal®). Methods used for necropsy and processing hosts follow McAllister et al. (1991b). Formalin-fixed tissues were sectioned at 7 µm, stained with Mayer's hematoxylin and eosin, and mounted in gum damar. Live tetrathyridia were removed from the coelomic cavity of 1 host, rinsed in Dulbecco's phosphate-buffered saline (pH = 7.3), and mailed by air express to the junior author (D.B.C.) at St. Lawrence University. In an attempt to obtain adults, some of these living tetrathyridia were administered in groups of 3 by stomach tube to 9 young golden hamsters, *Mesocricetus auratus*. The remainder were either fixed for morphological study, or were inoculated intraperitoneally into 6 young laboratory-reared mice for maintenance; mice were necropsied up to a maximum of 6 mo postinoculation to check for asexual proliferation. Tetrathyridia and experimentally obtained adults were fixed in AFA (alcohol–formalin–acetic acid), stained in Semichon's acetocarmine, and mounted whole in gum damar.

Voucher specimens of lizards are deposited in the Arkansas State University Museum of Zoology (ASUMZ). Vouchers of *Mesocestoides lineatus* have been deposited in the U.S. National Parasite Collection, USDA, Beltsville, Maryland 20705, as USNM Helm. Coll. Nos. 81931 (tetrathyridia) and 81932 (adults).

Only 1 (3%) of the *S. u. hyacinthinus* was found to harbor *Mesocestoides* sp. tetrathyridia. The host was an adult female (68 mm SVL, ASUMZ 16998) collected on 23 November 1990 from

Yell County, Arkansas. Numerous encapsulated tetrathyridia were observed in the liver, intestinal mesenteries, and musculature. Each capsule contained from 1 to several tetrathyridia. In addition, over 300 individual live tetrathyridia were found free within the coelomic cavity. The tetrathyridia occurred as 2 distinct size classes, but otherwise were morphologically identical. None possessed multiple scolices, supernumerary suckers, buds, or any other morphological evidence of asexual proliferation; this was true of those taken directly from naturally infected lizards and those maintained for up to the maximum of 6 mo in experimentally infected mice. Furthermore, the number of tetrathyridia recovered from experimentally infected mice in each case was equal to or lower than the number inoculated.

Tetrathyridia administered to hamsters developed into gravid adults having morphological features fitting the description of *Mesocostoides lineatus* (Goeze, 1782). Tetrathyridia of both size classes developed into adults that were identical in both size and morphology.

Tetrathyridia of *Mesocostoides* have been reported from several North American *Sceloporus* lizards. Host reports include the western fence lizard, *S. occidentalis* Baird and Girard, 1852, from California (Voge, 1953; Specht and Voge, 1965), sagebrush lizards, *S. graciosus* Baird and Girard, 1852, from California (Telford, 1970), desert spiny lizards, *S. magister magister* Hallowell, 1854, from Arizona (Benes, 1985), Texas spiny lizards, *S. olivaceus* Smith, 1934, from Texas (McAllister, 1988), San Joaquin fence lizards, *S. occidentalis biseriatus* Hallowell, 1854, from California (Goldberg and Bursey, 1990a), Yarrow's spiny lizard, *S. jarrovi jarrovi* Cope, 1875, from Arizona (Goldberg and Bursey, 1990b) and bunch grass lizards, *S. scalaris slevini* Smith, 1937, from Arizona (Goldberg and Bursey, 1992). Among these, most were identified only as *Mesocostoides* sp. The only exception was that of Specht and Voge (1965) who identified their aberrant asexually proliferative tetrathyridia as *Mesocostoides corti* Hoeppli, 1925, an identity that was later questioned by Beaver (1989). However, Etges (1991) recently proposed the name *Mesocostoides vogae* for the species of asexually proliferative tetrathyridia originally described by Specht and Voge (1965).

The absence of any evidence of asexual proliferation in the present study further substantiates the rarity of asexually reproducing tetra-

thyridia in natural populations. Furthermore, the occurrence of more than 300 tetrathyridia in a single host, with more than 1 in many individual host capsules, is consistent with reports from other naturally infected hosts, thus further confirming that such large numbers do not result from asexual proliferation (Conn, 1990; McAllister and Conn, 1990). The 2 size classes of tetrathyridia reported here do not belong to different species, because both were of identical size and morphology as adults. The size difference may have resulted from 2 separate incidents of infection, with the smaller tetrathyridia having been acquired more recently by the host.

The size and morphological features of adult tapeworms obtained experimentally in the present study were identical to those reported as *M. lineatus* by Conn and Etges (1984) and Conn et al. (1984) from green anoles, *Anolis carolinensis* (Voigt, 1832), from Louisiana (USNM Helm. Coll. Nos. 78123 and 78124). In the latter cases, the worms were isolated as tetrathyridia from naturally infected lizards and developed into gravid adults in experimentally infected golden hamsters.

In conclusion, *S. u. hyacinthinus* constitutes a new host for *M. lineatus*. McAllister et al. (1991c) recently reported tetrathyridia of *Mesocostoides* from 2 of 51 (4%) six-lined racerunners, *Cnemidophorus sexlineatus* (Linnaeus, 1766), from Arkansas. Therefore, the present study represents only the second time tetrathyridia of *Mesocostoides* have been reported from an Arkansas lizard. In addition, Richardson et al. (1992) reported *Mesocostoides* spp. from 10 of 30 (33%) raccoons, *Procyon lotor* (Linnaeus, 1758), in north-central Arkansas. Perhaps raccoons are but 1 of many carnivores that serve as natural definitive hosts of species of *Mesocostoides* from lizards.

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